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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,404	12/01/2003	Shuichi Suzuki	67336-015	8895

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MCDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS , from the mailing date of this communication.

Office Action Summary	Application No. 10/724,404	Applicant(s) SUZUKI ET AL.	
	Examiner Raymond Alejandro	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 January 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This correspondence is submitted in reply to applicant's amendment dated 01/08/07. The applicant has overcome the objections, the 35 USC 112 rejections, the 35 USC 102 rejection and the 35 USC 103 rejection over Tani et al'499. Refer to the abovementioned amendment for substance of applicant's rebuttal arguments and remarks. However, the present claims are finally rejected over new ground of rejection including newly discovered references as set forth hereunder and for the reasons of record:

Drawings

1. The drawings were received on 01/08/07. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4 are rejected under 35 U.S.C. 102(e) as being anticipated by Petricevic et al 6503655.

The present application is geared toward an electrode wherein the disclosed inventive concept comprises the specific arithmetic average roughness.

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As to claims 1-2 and 4:

Petricevic et al disclose a gas diffusion electrode having a catalyst coating thereon (COL 1, lines 24-30). Disclosed is the fuel cell including the membrane/electrode unit comprising a solid electrolyte on both sides of which porous gas diffusion electrodes having a catalyst coating are located (COL 1, lines 13-33). Distribution of oxygen to the cathode side and hydrogen to the anode side of the fuel cell through fluid distribution plates is implicitly contemplated by Petricevic et al (COL 1, lines 27-33).

The invention relates to a gas diffusion electrode comprising carbon and to a process for producing it.

Gas diffusion electrodes are used, in particular, in batteries and especially in fuel cells such as PEM fuel cells (PEM=polymer electrolyte membrane). In fuel cells, for example, the energy stored chemically in hydrogen and oxygen which would be released in a hydrogen-oxygen reaction, can be converted into electrical energy by means of an electrochemical process which represents a reversal of the electrolysis of water.

PEM fuel cells have a central membrane/electrode unit comprising a thin, proton-conducting solid state electrolyte on both sides of which very smooth, hydrophobic, porous gas diffusion electrodes having a catalyst coating are located. Oxygen is fed to the electrode on the cathode side while hydrogen is fed to the electrode on the anode side. An electron exchange takes place on the catalyst-coated surfaces of the electrodes, as a result of which an electric potential is built up. On the cathode side, water is formed as reaction product of the electrochemical process.

lyte. The electrodes should therefore have a surface roughness which is at most in the micron range. To make sufficient

Examples 1-2 and 5 exemplify gas diffusion electrode wherein the surface roughness of the electrode is of the same order or magnitude of a pore diameter of 1 μm (Example 1), and/or 10 μm (Example 2), and/or 0.1 μm (Example 5).

As to claim 3:

Disclosed is the use of modified carbon papers which are densified on the surfaces by carbon black or graphite (COL 1, lines 50-54).

Thus, the present claims are anticipated.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of the publication WO 2002/89240 (*for which US 2004/0137303 represents an English version thereof as they both belong to the same patent family*) (heretofore *Kuroki et al*).

As to claims 1 and 4:

The AAPA discloses fuel cells including a basic unit constituted of a cell including an anode disposed opposite to a cathode via an electrolyte; and the cell being held between one pair of separators on which ribs and gas channels are formed; a fuel gas is supplied to a gas channel on an anode side; air is supplied as an oxidant to the gas channel on a cathode side, and power is

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generated. The fuel cell includes a polymer electrolyte fuel cell using a proton exchange membrane (*Applicant's specification at page 1, lines 12-26*).

The AAPA goes to disclose a conventional gas diffusion layer including a carbon paper subjected to the water-repellent treatment coated with carbon paste; and a carbon powder having a particle size of about 75 μm or carbon powder XC-72 is used to prepare the carbon paste (*Applicant's specification at page 12, lines 9-22*). Specifically, it is disclosed that in the conventional gas diffusion layer surface, a maximum height R_y is about 60 μm . When this is converted to the arithmetic average roughness R_a the value is 15 μm (*Applicant's specification at page 14, lines 17-26*). **Comparative Example** (*equivalent of the conventional gas diffusion electrode*) shows an Arithmetic average roughness R_a of 15 μm (See Applicant's **Table 1**).

The AAPA discloses an electrode for a fuel cell as described above. However, the preceding reference fails to expressly disclose the specific roughness of the gas diffusion layer surface.

With respect to claims 1-2 and 4:

Kuroki et al discuss in paragraph 0054 the surface roughness of the gas diffusion layer. Paragraph 0067 makes known that if the surface roughness in the gas diffusion layer is 0.1 μm or more, preferably, 1 μm or more, it is convenient because better adhesion on gas diffusion surface is achieved, and the material contacting it will be sufficiently secured thereto (P0067).

With these teachings, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to make the gas diffusion electrode of the AAPA by having the specific surface roughness of the gas diffusion layer of Kuroki et al because Kuroki et al disclose that a surface roughness in the gas diffusion layer of 0.1 μm or

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more, preferably, 1 μm or more, is convenient because better adhesion on gas diffusion surface is achieved, and the material contacting it will be sufficiently secured thereto. *Thus, Kuroki et al directly teach the advantages of using a gas diffusion layer having an average surface roughness within the claimed range regardless of the specific material making contact therewith.*

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admission of Prior Art (heretofore 'the AAPA') in view of the publication WO 2002/89240 (*for which US 2004/0137303 represents an English version thereof as they both belong to the same patent family*) (heretofore *Kuroki et al*) as applied to claims 1-2 above, and further in view of the Japanese publication JP 10-289732 (herein called the JP'732).

The AAPA and Kuroki et al are applied, argued and incorporated herein for the reasons expressed above. However, the preceding references do not expressly disclose the specific carbon powder charged in a porous carbon substrate.

The JP'732 discloses a charging a carbon powder in the gas diffusion layer to establish both the gas and water diffusion properties (*See Applicant's specification at page 2, lines 18-22*).

With these teachings, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to use the specific the specific carbon powder charged in a porous carbon substrate of the JP'732 in the electrode of the AAPA and Kuroki et al as it is disclosed that such a carbon powder charged in the porous carbon substrate permits establishing both gas and water diffusion properties. Thus, gas and water diffusion properties are improved when carbon powder is charged in the carbon substrate.

Response to Arguments

8. Applicant's arguments with respect to claims 1-4 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

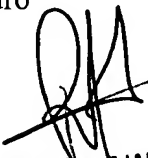
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond Alejandro
Primary Examiner
Art Unit 1745


RAYMOND ALEJANDRO
PRIMARY EXAMINER